Incremental Prototyping Model for the Development of Educational Platforms: a Process of Design and Quality Standards

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Abstract: Incremental Prototyping Method is an engineering methodology which is presented as appropriate to collect progressive contributions of users and experts of technological solutions that are designed to meet educational challenges. This paper presents the design process that is based on four circuits: theoretical, pedagogical, and technological and management. These circuits involved experts from different disciplines such as; computer engineering, computer science education, graphic design and communication and education. Results show educational platforms which are the result of a recurring review process of the developed technological products and the inclusion of quality standards. That ensures the usability of the product; this means that the product must be coherent and consistent with the educational purpose for which it was initially required.

Keywords: Método Incremental prototype Method, educational platforms, quality standards.
Categories: L.3.6, L.6.0, L.6.1

1 Introduction

Numerous studies indicate that Information and Communication Technologies (ICT) contribute to economic, social development, and to the modernization of the state and its institutions. They also contribute to equity in access to information [Lugo, 10; Hepp, 04, 11]. The use of ICT has been sharply incorporated in school systems during over a decade in school systems. Its impact has generated that traditional learning contexts are complemented by new technologies, especially virtual platforms as Wandering [Baraka & ZivVera, 13], EduXs [Chang, Yang, Deng & Chan, 03], CADI [Cabrera-Lozoya, Cerdan, Cano, Garcia-Sanchez & Lujan, 12] y The HumBox [Millard, Borthwick, Howarda, McSweeneya & Hargooda, 13] which are a set of structures, policies, technical, strategies and learning elements that are integrated into the implementation of the teaching-learning process [Vera & Careaga, 12; Galindres & Garcia, 09].
This publication proposes a framework to fit together the metalanguage and the individual looks with the different disciplines involved in the management processes of educational solutions that are based on the pedagogical use of ICT. The technological development methodology proposed to design and optimize virtual platforms for educational purposes is called Incremental Prototyping Method (IPM). This method consists of applying an engineering design to educational challenges that can be solved by combining face-to-face and online teaching. The first phase is to define the methodological and communicational issues related to education, then the most appropriate technology architecture to improve learning and gradually add the details according the development the different phases proceeds, instances of evaluation and optimization of the prototypes.

In the incremental models of reference, each linear sequence causes an increase in the prototype, which is a product of a portion of the operational system platform development. In the process, the first increase usually becomes an essential product. Key informants who provide relevant information to evaluate and optimize the prototypes may be experts in pedagogy and advance ICT user, and virtual platform users, who initially evaluate the product then the new sequence is iterated repeating phases of analysis, design and development. The process is considered evolutionary because in each cycle of analysis, design and evolution, gradually refine strategic and tactical decisions related to pedagogical and technological factors.

This platform development methodology requires successive stages including at least: implementation, evaluation, optimization and routinization. In these stages, inputs from interdisciplinary teams are coordinated. To do this, the multidisciplinary teams are part of the realization of a set of activities, such as project definition, which covers the problem, analysis and definition; design and specification, implementation incremental prototypes and final product construction. The success of a platform is the development of a thematic content supported by an instructional design, a reliable technology platform that ensures fast access to the system, and a technical support that gives quick and effective solutions [Marquina, 07].

2 Incremental Prototyping Model for the Development of Educational Platforms

The proposed model includes six phases in the design and development of learning platforms which can be applied to learning modalities in mixed contexts and distance learning (b-learning or e-learning).

The phases are recursive, linking prototypes with pilot programs and stages of expansion and routinization. The processes are recycled depending on the application of quality criteria that enable to optimize permanently pedagogical and technological solutions designed [Shih, Tseng & Yang, 08] and put into action (see Figure 1).

- **Incubation phase:** It is the discussion about the main idea supported by pedagogical requirements. It considers a preliminary analysis that allows us to refine, and include the idea of the four balanced circuits: theoretical, pedagogical, and technological and management.